

REMARKS

Applicants amended claim 1, 23, 25, 26, and 31, canceled claim 2, and added new claims 35 and 36. In particular, Applicants amended claims 23, 25, and 26 to be in proper independent form, so these claims should be passed to allowance, as indicated by the Examiner. Claims 1, 3-36 (attached), of which claims 1, 31, and 35 are in independent form, are presented for examination.

The Examiner rejected claims 1, 8, 16-18, and 30 under 35 U.S.C. §102(b) as anticipated by U.S. 5,108,852 (Tomantschger) or U.S. Patent No. 5,938,798 (Hanawa). Applicants amended claim 1, the only independent claim in these rejections, to include the features of claim 2. Claim 2 was not rejected as anticipated by Tomantschger or Hanawa, and therefore, the §102(b) rejections should be withdrawn.

The Examiner rejected claims 19-22 under 35 U.S.C. §102(b) as anticipated by Tomantschger. Claims 19-22 depend from amended claim 1 and are patentable for at least the same reasons discussed above that claim 1 is patentable over Tomantschger.

The Examiner rejected claims 2-7 and 9-12 under 35 U.S.C. §103(a) as being unpatentable over either Tomantschger or Hanawa. But neither Tomantschger nor Hanawa suggests a primary alkaline battery including a cathode having less than about 5% of carbon fibers by weight, as recited in amended claim 1.

Tomantschger is directed to secondary, or rechargeable, alkaline cells. As explained by Tomantschger, secondary cells are completely different from the claimed primary cells, which are not rechargeable. (See, e.g., Tomantschger at col. 1, lines 41-53.) Indeed, it is telling that even though Tomantschger is evidently aware of primary cells, Tomantschger provides no suggestion or incentive for forming a primary alkaline battery including a cathode having less than about 5% of carbon fibers by weight, as claimed. Therefore, the rejection over Tomantschger should be reconsidered and withdrawn.

Hanawa is even further removed than Tomantschger in that Hanawa teaches away from using carbon fibers. In describing a cathodic active material, Hanawa states:

There have conventionally been known methods for enhancing the electron conductivity of the cathodic active material, for instance, a method which

comprises rubbing fine particles of graphite against the surface of electrolytic manganese dioxide and a method comprising co-precipitating electrolytic manganese dioxide and carbon fibers during electrolysis in an electrolyte in which carbon fibers are suspended. However, the inventors have found out that the cathodic active material exhibits the highest activity when the graphite component used has the lowest possible thickness while holding the scaly shape thereof to optimize the electron conductivity and electrolytic manganese dioxide particles having a particle size smaller than that of the graphite are adhered to the surface of the scaly graphite particles. (See Hanawa col. 6, lines 52-67, emphasis added.)

Subsequently, Hanawa describes producing the cathodic active material using graphite particles. (See, e.g., Hanawa col. 7, line 29 et seq.) Thus, in light of Hanawa's disclosure, one skilled in art reading Hanawa would be motivated to use scaly graphite particles. One skilled in the art would not be motivated to use carbon fibers at all, let alone try to optimize the amount of carbon fibers, as suggested by the Examiner. Applicants request that the Examiner reconsider and withdraw the §103(a) rejection over Hanawa.

The Examiner has rejected claims 13-15, 24, 27, and 30-34 under 35 U.S.C. §103(a) as being unpatentable over either Tomantschger or Hanawa, each in view of U.S. Patent No. 5,110,693 (Friend). As discussed above, neither Tomantschger nor Hanawa suggests primary alkaline battery including a cathode having carbon fibers. Hanawa indeed teaches away from using carbon fibers.

Friend describes incorporating carbon microfibers in an electrochemical cell, but only in catalytic electrodes of fuel cells and metal air cells. Friend does not disclose or suggest forming a primary alkaline battery having a cathode including carbon fibers, as claimed. Nor does Friend disclose or suggest the claimed concentration of carbon fibers in the cathode. Thus, Friend does not cure the deficiencies of either Tomantschger or Hanawa, and the rejection should be withdrawn.

The Examiner rejected claims 28 and 29, which depend from claim 1, under 35 U.S.C. §103(a) as being unpatentable over either Tomantschger or Hanawa, each in view of U.S. Patent No. 5,041,199 (DiFranco). The Examiner relied on DiFranco for disclosing a cathode having a surfactant.

But DiFranco does not cure the deficiencies of Tomantschger or Hanawa, as discussed above with regard to claim 1. That is, DiFranco does not disclose or suggest a primary alkaline battery including a cathode having less than about 5% of carbon fibers. Therefore, claims 28 and 29 are patentable for at least the same reasons that claim 1 is patentable, and the rejection should be withdrawn.

The Examiner rejected claims 30-34 under 35 U.S.C. §112, first paragraph, because the specification does not reasonably provide enablement for carbon particles of any possible shape with the claimed range of diameters. From the Examiner's explanation of the rejection, Applicants assume the Examiner is referring to claims 31-34. The Examiner also rejected claims 31-34 under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants amended claim 31 to obviate the rejection. Therefore, the §112 rejection of claims 31-34 should be withdrawn.


New claims 35 and 36 are also patentable over the cited references, none of which disclose or suggest a primary alkaline battery having a cathode including greater than about 86% of a cathode active material by weight and carbon fibers.

Applicants believe the claims are in condition for allowance, which action is requested.

Attached is a marked-up version of the changes being made by the current response. Enclosed are a check for excess claim fees and a check for the Petition for Extension of Time fee. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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Version with markings to show changes made

In the claims:

Claim 2 has been cancelled.

Claims 1, 23, 25, 26, and 31 have been amended as follows:

1. (Amended) A primary alkaline battery, comprising:

a cathode comprising a cathode active material and carbon fibers;

an anode;

a separator; and

an alkaline electrolyte,

wherein the cathode comprises less than about 5% of carbon fibers by weight.

23. (Amended) [The battery of claim 22] A primary alkaline battery, comprising:

a cathode comprising a cathode active material and carbon fibers;

an anode;

a separator; and

an alkaline electrolyte,

wherein the carbon fibers comprise between about 40 and about 100 layers of graphite.

25. (Amended) [The battery of claim 1] A primary alkaline battery, comprising:

a cathode comprising a cathode active material and carbon fibers;

an anode;

a separator; and

an alkaline electrolyte,

wherein the carbon fibers have a surface energy between about 50 mJ/m² and about 300 mJ/m².

26. (Amended) [The battery of claim 1] A primary alkaline battery, comprising:

a cathode comprising a cathode active material and carbon fibers;

an anode;

a separator; and

an alkaline electrolyte,

wherein the carbon fibers have a graphitic index of less than about 85%.

31. (Amended) A primary alkaline battery, comprising:

a cathode comprising manganese dioxide and a heat-treated carbon [material] fiber

having a diameter less than about 250 nanometers;

an anode;

a separator; and

an alkaline electrolyte.

Please add the following new claims:

35. A primary alkaline battery, comprising:

a cathode comprising a cathode active material and carbon fibers;

an anode;

a separator; and

an alkaline electrolyte,

wherein the cathode comprises greater than about 86% of the cathode active material by weight.

36. The battery of claim 35, wherein the cathode comprises manganese dioxide.